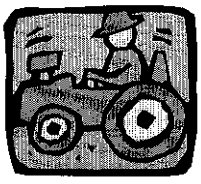
7. Land Use, Social Issues, and Economics

7.1 Agricultural Land and Water Use

The CALFED Bay-Delta Program would provide increased water security for the majority of agricultural users in the state but also would convert existing farmlands to other uses.



7.1 Agricultural Land and Water Use

7.1.1 SUMMARY

Agricultural resources are an important feature of the existing environment of the state, and are recognized and protected under CEQA and state policy. One of the major principles of the state's environmental and agricultural policy is to sustain the long-term productivity of the state's agriculture by conserving and protecting the soil, water, and air that are agriculture's basic resources. It is CALFED Bay-Delta Program (Program) policy that adverse environmental effects on agricultural resources resulting from CALFED programs, projects, and actions will be fully assessed and disclosed under CEQA, and avoided or mitigated as required by CEQA. Assessment, disclosure, and avoidance and other mitigation strategies will be developed at the programmatic and project-specific levels in consultation with other state, federal and local agencies with special expertise or authority over agricultural resources which may be affected by the project—such as the California Department of Food and Agriculture and Department of Conservation.

California agriculture is the most productive and diverse in the world, due in large measure to the unique combination of high quality soils, favorable climate, and the ability to manage water.

Agriculture is one of the foundations of California's prosperity. Agriculture provides employment for one in every ten Californians, and provides a variety and quantity of foodstuffs that both feed the nation and provide a significant source of international exports. California leads the nation in the production of many commodities, including wine grapes, walnuts, and artichokes. Because of California's high-quality soils, temperate climate, and access to irrigation water, the state's growers and workers are able to produce over 250 different food, fiber, and livestock commodities. Agriculture in the state is facing increasing competition for the water it uses to help restore environmental resources and to meet the needs of California's expanding urban population.

Preferred Program Alternative. The Preferred Program Alternative would increase certainty in the availability of irrigation water. As lands and waters are restored to their natural functions, the recovery of endangered species and the maintenance of species that might otherwise become threatened will result in a stable flow of water to the state's growers. As cleaner water with fewer contaminants becomes available through the Water Quality Program, growers will have opportunities to be more flexible in their plantings and to grow higher value crops. The Watershed Program would assist in providing adequate, high-quality water available to farmers and may provide higher grazing productivity. The Levee System Integrity Program would ensure that agriculture on Delta islands is protected from disastrous flooding and that other Delta water irrigation water users are protected from the salt-water intrusion that island flooding could cause. The

The Preferred Program Alternative would increase certainty in the availability of high-quality irrigation water and ensure that agriculture on Delta islands is protected from disastrous flooding.

Water Use Efficiency Program would allow farmers to update aging and inefficient irrigation systems, resulting in increased yields and new crop opportunities. The Water Transfer Program may result in additional water becoming available at times and locations where irrigation water may not otherwise be available. The Storage and Conveyance elements would ensure that adequate water is available for the state's growers.

The Preferred Program Alternative would convert a substantial amount of agricultural lands to other uses, including habitat, levee improvements, and water storage. This conversion would add to the existing state-wide conversion of substantial amounts of agricultural lands to urban uses and other habitat uses, and would conflict with the adopted plans of many local governments. Increased water demand from the Ecosystem Restoration Program would reduce water supply reliability to agriculture, but other Program actions would result in an overall increase in water supply reliability to agriculture. The transfer of water from one area to another may result in localized adverse impacts on agriculture in the source water areas and may result in beneficial effects on agriculture in the receiving areas. Mitigation strategies have been developed that could lessen many of the impacts of the Program; however, a significant loss of agricultural lands, including some of the state's most productive lands, would occur.

The Preferred Program Alternative would convert a substantial amount of agricultural lands to other uses, including habitat, levee improvements, and water storage.

Alternatives 1, 2, and 3. All three Program alternatives would result in impacts on agriculture similar to impacts described for the Preferred Program Alternative. All three alternatives also would provide benefits essentially similar to those of the Preferred Program Alternative. Alternative 1 likely would result in fewer impacts on agriculture because fewer facilities would be constructed. Alternative 3 likely would result in the greatest impacts because construction of an isolated facility could require converting somewhat more agricultural land. The differences are not substantial, however, and an adverse impact that is potentially significant for one alternative would be potentially significant for all alternatives.

The following table presents the potentially significant adverse impacts and mitigation strategies associated with the Preferred Program Alternative. Mitigation strategies that correlate to each listed impact are noted in parentheses after the impact. (See Chapter 9 for a discussion of mitigation monitoring and implementation.)

Potentially Significant Adverse Impacts and Mitigation Strategies Associated with the Preferred Program Alternative

Potentially Significant Adverse Impacts	Mitigation Strategies
Conversion of prime, state-wide important, and unique farmlands to project uses (1,2,5,6,7,8,9,10, 11,12,13,14,15,16,17,18,20,21,24).	1. Siting and aligning Program features to avoid or minimize impacts on agriculture.
Conflicts with local government plans and policies (3,4).	2. Examining structural and nonstructural alternatives to achieving project goals in order to avoid impacts on agricultural land.
Conflicts with adjacent land uses (19,22,23).	3. Implementing features that are consistent with local and regional land use plans.

Potentially Significant Adverse Impacts and Mitigation Strategies Associated with the Preferred Program Alternative (continued)

4. Involving all affected parties, especially landowners and local communities, in developing appropriate configurations to achieve the optimal balance between resource impacts and benefits.

5. Retaining water allocations from retired drainage-impaired lands within the existing water districts.

6. Supporting the testing and application of alternative crops to idled farmland (for example, agroforestry or energy crops).

7. Providing water supply reliability benefits to agricultural water users.

8. Supporting the Agricultural Land Stewardship Program in acquiring easements on agricultural land in order to prevent its conversion to urbanized uses and increase farm viability.

9. Restoring existing degraded habitat as a priority before converting agricultural land.

10. Focusing habitat restoration efforts on developing new habitat on public lands before converting agricultural land.

11. If public lands are not available for restoration efforts, focusing restoration efforts on acquiring lands that can meet ecosystem restoration goals from willing sellers where at least part of the reason to sell is an economic hardship (for example, lands that flood frequently or where levees are too expensive to maintain).

12. Using farmer-initiated and developed restoration and conservation projects as a means of reaching Program goals.

13. Where small parcels of land need to be acquired for waterside habitat, seeking out points of land on islands where the ratio of levee miles to acres farmed is high.

14. Obtaining easements on existing agricultural land for minor changes in agricultural practices (such as flooding rice fields after harvest) that would increase the value of the agricultural crop(s) to wildlife.

15. Including provisions in floodplain restoration efforts for compatible agricultural practices.

16. Purchasing water for habitat purposes so that the same locality is not affected over the long term.

17. Using a planned or phased habitat development approach in concert with adaptive management.

18. Minimizing the amount of water supply required to sustain habitat restoration acreage.

19. Developing buffers and other tangible support for remaining agricultural lands. Vegetation planted on these buffers should be compatible with farming and habitat objectives.

20. In implementing levee reconstruction measures, working with landowners to establish levee reconstruction methods that avoid or minimize the use of agricultural land.

21. Working with landowners to establish levee subsidence BMPs that avoid impacts on land use practices. Through adaptive management, further modify BMPs to reduce impacts on agricultural land.

22. Implementing erosion control measures to the extent possible during and after project construction activities. These erosion control measures can include grading the site to avoid acceleration and concentration of overland flows, using silt fences or hay bales to trap sediment, and revegetating areas with native riparian plants and wet meadow grasses.

23. Protecting exposed soils with mulches, geotextiles, and vegetative ground covers to the extent possible during and after project construction activities in order to minimize soil loss.

24. Using rotational fallowing to reduce selenium drainage.

Bold indicates a potentially significant unavoidable impact.

7.1.2 AREAS OF CONTROVERSY

Areas of controversy as defined by CEQA involve differences of opinion among technical experts or information that is not available and cannot be readily obtained. An area of controversy for this resource is the amount of water used by wetland habitat, and how much more water would be needed for wetlands created on presently irrigated agricultural lands. A thorough search by Program water use staff found no comprehensive studies of this issue that apply directly to California. Studies done in Utah and Florida have been reviewed and adjusted for California conditions, but their conclusions show a wide range of variance. For this section, the higher end of water use for wetland evapotranspiration versus crop evapotranspiration, as shown in the two above-cited studies, is used. It is acknowledged that experts disagree on this issue.

7.1.3 AFFECTED ENVIRONMENT/ EXISTING CONDITIONS

7.1.3.1 ALL REGIONS

The Program study area represents an important agricultural region for both California and the United States. California is the most diversified agricultural economy in the world, producing more than 250 crop and livestock commodities. The study area encompasses approximately 85% of total California irrigated land, covering all or portions of 39 of the 58 counties in California. In 1995, the 39 counties together contributed about 95% of California's agricultural production value and represented nine of the top ten agricultural counties in California, and seven of the top ten counties in the nation. Agriculture in the study area is also an important employer that affects the regional economy through the expenditures of farmers and the processing and transportation of crops harvested.

The Program study area represents an important agricultural region for both California and the United States. California is the most diversified agricultural economy in the world, producing more than 250 crop and livestock commodities.

Agricultural Land Use. The USDA Natural Resources Conservation Service (NRCS) and California Department of Conservation (DOC) distinguish among four basic designations of farmland: Prime Farmland, Additional Farmland of Statewide Importance, Unique Farmland, and Additional Farmland of Local Importance. The DOC adds a designation of Grazing Land.

Prime farmland is land best suited for producing food, feed, forage, fiber, and oilseed crops that also is available for these uses.

Prime farmland has the soil quality, growing season, and moisture supply needed to produce sustained high yields or crops economically when treated and managed (including water management) according to modern farming methods.

Farmland of statewide importance is land other than prime farmland with a good combination of physical and chemical characteristics for producing food, feed, forage,

Agriculture in the five Program study regions receives irrigation water from the CVP, the SWP, local water rights and water projects, and groundwater. Most of this water is delivered to farmers through irrigation districts and other water agencies. The availability and reliability of a supply of high-quality water limit the productivity of important farmlands.

fiber, and oilseed crops. Both prime farmland and farmland of statewide importance must be cultivated and irrigated to qualify under the DOC's important farmland system.

Unique farmland is land other than prime farmland and farmland of statewide importance that is used to provide specific high-value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality or high yields of a specific crop when treated and managed according to modern farming methods. Examples of such crops are citrus, olives, avocados, fruit, and vegetables.

Additional farmland of local importance is land used for the production of food, feed, forage, fiber, and oilseed crops, even though these lands are not identified as having national or state-wide importance. These lands are identified by a local committee made up of concerned agencies and organizations that reviews the lands under this category on at least a 5-year rotational basis.

Grazing land is similar to additional farmland of local importance, but the land is grazed by cattle or sheep rather than being used for crops.

Table 7.1-1 shows totals of 1996 important farmland acreage based on information from the DOC's Farmland Mapping and Monitoring Program for counties in the Central Valley. The numbers are totals of important farmland acreage (including prime and unique farmland, and farmland of local and state-wide importance) in the Delta, Sacramento River, and San Joaquin River Regions—the regions where important farmland is most likely to be affected. (It is important to note that several of the counties in the study area have not been completely surveyed by the DOC for important farmland and that these summaries have been approximated based on irrigation studies. DOC prepares conversion and acreage reports biennially—the latest figures available currently are for 1996. See Plates 2 and 3 at the end of this document for a generalized representation of important farmlands in the Delta, Sacramento River, and San Joaquin River Regions. For a detailed discussion of the Farmland Mapping and Monitoring Program and acreages by county, visit the DOC's internet web site at **http://www.consrv.ca.gov/olc/farmland.html**.)

Table 7.1-1. Important Farmland in the Central Valley

PROGRAM REGION	ACRES
Delta Region	641,229
San Joaquin River Region	3,751,089
Sacramento River Region	2,442,276
Total	**6,834,594**

Table 7.1-2 identifies approximate acres in irrigated agriculture for each of the five Program regions.

Agricultural Water Use. Agricultural lands in the five Program study regions receive irrigation water from the CVP, the SWP, local water rights and water projects, and groundwater. Most of this water is delivered to farmers through irrigation districts and other water agencies. The availability and reliability of a supply of high-quality water limit the productivity of important farmland.

Table 7.1-3 provides agricultural water use and water pricing in all Program regions from 1985 to 1990.

Table 7.1-2. Irrigated Acres and Production Value in All Program Regions, 1986 to 1995

	DELTA REGION		BAY REGION		SACRAMENTO RIVER REGION		SAN JOAQUIN RIVER REGION		OTHER SWP AND CVP SERVICE AREAS	
Crop Category	Irrigated Acres (1,000 acres)	Production Value (million dollars)	Irrigated Acres (1,000 acres)	Production Value (million dollars)	Irrigated Acres (1,000 acres)	Production Value (million dollars)	Irrigated Acres (1,000 acres)	Production Value (million dollars)	Irrigated Acres (1,000 acres)	Production Value (million dollars)
Pasture	37	4	15	2	189	19	290	34	185	15
Alfalfa	65	37	50	9	161	68	527	374	420	258
Sugar beets	15	13	0	0	28	25	51	54	,32	40
Field crops	151	76	16	10	335	176	786	532	154	67
Rice	11	9	0	0	469	394	18	12	0	0
Truck crops	28	77	47	280	16	31	301	982	289	1,514
Tomatoes	45	91	4	10	135	234	180	433	8	47
Orchards	61	177	26	148	265	578	668	2,074	22	343
Grains	60	16	14	3	175	43	344	103	146	47
Grapes	36	127	70	316	10	42	507	1,681	37	215
Cotton	0	0	0	0	4	2	1,269	1,153	20	19
Subtropical orchards	0	0	0	0	15	30	221	973	167	842
Total	**509**	**628**	**244**	**779**	**1,803**	**1,642**	**5,162**	**8,403**	**1,481**	**3,408**

Sources:
County agricultural commissioner reports, various years.

Table 7.1-3. Agricultural Water Use and Water Pricing in All Program Regions, 1985 to 1990

	IRRIGATION APPLIED WATER USE BY PROGRAM REGION (TAF)				
WATER SOURCE	DELTA	BAY	SACRAMENTO RIVER	SAN JOAQUIN RIVER	OTHER SWP AND CVP SERVICE AREAS
Local water	1,100	123	1,801	4,854	107
CVP water	85	54	1,467	4,268	0
SWP water	0	13	1	1,168	232
Groundwater	110	544	1,448	1,803	229
	WEIGHTED AVERAGE PRICE ($/af)				
Surface water	0-15	15-45	0-15	20-85	15-255
Groundwater	20-35	60-130	30-60	30-80	80-120

Notes:
af = Acre-feet.
TAF = Thousand acre-feet.

Source:
DWR 1994.

Central Valley Project. The CVP supplies about 30% of the total agricultural water use in the study area. Most CVP water is delivered to the Central Valley counties in the Sacramento River and San Joaquin River Regions. CVP water is delivered to approximately 250 water districts, individuals, and companies through water service contracts, Sacramento River water rights, and San Joaquin River exchange contracts. The terms "water service contract" and "project water" refer here to water developed by the CVP and delivered pursuant to repayment and water service contracts.

Of the total agricultural water use in the study area, the CVP supplies about 30%, the SWP about 10%, local surface water supplies (those not delivered by either project) about 40%, and groundwater provides about 20%.

State Water Project. The SWP supplies about 10% of the total agricultural water use in the Program study area. Through contracts with 29 water agencies, the SWP provides water in the Central Valley to Butte, Solano, Kings, and Kern Counties; outside the Central Valley to several southern California counties; to Alameda and Santa Clara Counties in the South Bay Area; and to Napa and Solano Counties in the North Bay Area. In addition, the SWP provides water rights deliveries to water rights holders along the Feather River (Butte and Plumas Counties).

Local Surface Water. Local surface water supplies (those not delivered by either project) provide about 40% of all agricultural water supplies in the Program study area. More local surface water supplies are available on the east side of the valley because of the larger amount of precipitation in the Sierra Nevada. Locally owned water projects are especially important on the Yuba, Stanislaus, Tuolumne, Kings, and Merced Rivers; but local sources on the west side, such as the federal Solano Project, also are important.

Groundwater. Groundwater provides a significant supply of water for agriculture in normal years and often is used to reduce or eliminate shortages of surface water supplies during drought. On average, groundwater provides about 20% of the total agricultural water use in the Program study area.

Declining groundwater tables, subsidence, and loss of aquifer storage continue to be costly problems, particularly in the western and southern parts of the San Joaquin River Region and the Bay Region, where less surface water is available. Declining groundwater tables increase pumping costs. The costs of subsidence include damage to structures, failure of well casings, and the need for frequent surveying. The increased level of salinity and mineral content from groundwater, particularly in the San Joaquin Region, creates tailwater disposal issues and reduces crop flexibility. Water from the CVP and SWP had replaced some of the groundwater pumping, and withdrawals were about equal to estimated recharge by the 1970s. However, the droughts in the late 1970s and late 1980s to early 1990s, combined with the supply restrictions imposed by the CVPIA of 1992, the Bay-Delta Accord, and biological opinions have reduced surface water supplies and renewed the past trend of groundwater depletion throughout the valley.

Agricultural Habitats. Cropland, orchards, and vineyards have been developed on some of the state's most fertile soils. Soils supported a much greater diversity of native species and productive natural habitats historically than they do today. Many wildlife species have adapted to areas now converted to cropland. Wintering waterfowl and shorebirds consume waste grains left in fields after harvest, and use fields flooded for weed control, leaching, and creation of seasonal wetlands. For a more detailed discussion of the types and value of agricultural habitats and seasonal wetlands, see Section 6.2, "Vegetation and Wildlife," and the Revised Draft Ecosystem Restoration Program Plan.

Cropland, orchards, and vineyards have been developed on some of the state's most fertile soils. Soils supported a much greater diversity of native species and productive natural habitats historically than they do today.

7.1.3.2 DELTA REGION

Agricultural Land Use. Agriculture in the Delta Region began in the mid-1800s, consisting primarily of dryland farming or irrigated agriculture from artesian wells, groundwater

pumping, and creek-side diversions. Extensive Delta development began in late 1850, when the Federal Swamp Land Act promoted converting swamp and overflow lands to agricultural production. During the early 1900s, a series of levees and human-made waterways were developed to enhance future agricultural and urban development.

Today, of the nearly 750,000 acres in the Delta, about 641,000 acres are rich farmland. Most of this area is classified as prime farmland, farmland of state-wide importance, and unique farmland, or land with high state-wide significance for agricultural production. The Delta's rich peat and mineral soils support several types of agriculture. One of the unique problems with organic or peat soil is that, when exposed to aerobic conditions by farm cultivation, the soil oxidizes and erodes away. This process has led to a drop in land surface elevations several feet below sea level throughout much of the Delta from historical levels at or above sea level. For a more thorough discussion of this unique problem, see Section 5.5, "Geology and Soils."

Between 1976 and 1993, the total amount of agricultural land in the Delta was reduced by about 14,500 acres. This was largely due to conversion of agricultural land to urban uses in the Brentwood and Oakley areas of Contra Costa County, the Pocket area in Sacramento County, the West Sacramento area in Yolo County, and the Stockton and Tracy areas in San Joaquin County.

Agricultural Water Use. Most agricultural water users in the Delta are private water right holders. Local water rights water accounts for over 85% of the total irrigation water use. Other irrigation water sources in the Delta Region are CVP water and groundwater, each accounting for about 5-10% of the total agricultural water uses. Between 1985 and 1990, compared to other parts of California, the cost of water was much cheaper in the Delta Region because of large amounts of local riparian and pre-1914 appropriative water rights. These are the most secure agricultural water rights, as they are connected to the land; newer water supplies are less secure and more expensive.

Most agricultural water users in the Delta are private water right holders. Local water rights water accounts for over 85% of the total irrigation water use.

7.1.3.3 BAY REGION

Agricultural Land Use. As is characteristic of all the Program study regions, agriculture in the Bay Region expanded greatly during the Gold Rush of 1849. As more people arrived in California and urban development flourished along the Bay and in lower watershed areas, more land in the upper watersheds was brought into production. Although the number of farms between the end of World War II and the mid-1960s declined, the number of irrigated acres increased by 25%, with the average farm containing 51 acres. Orchards were by far the most important crop in the Bay Region, followed by vegetables and other truck crops (such as melons, potatoes, and garlic). Other crops included alfalfa, sugar beets, and field crops. Prior to the 1940s, land uses in the Bay Region were principally urban in the City of San Francisco and rural in other portions of the region. Over the last 50 years, however, land uses throughout the region have become pro-gressively more urbanized.

Approximately 493,000 acres of farmland categorized as important were mapped in 1996 for the Bay Region, including large acreages in Contra Costa, Solano, Napa, and Sonoma Counties.

Over 75% of irrigation water sources in the Bay Region are from groundwater pumping. Local water and project water make up the other 25%. Groundwater extractions commonly exceed groundwater replenishment; therefore, many of the region's aquifers are experiencing overdraft conditions.

Agricultural Water Use. Over 75% of irrigation water sources in the Bay Region are from groundwater pumping. Local water and project water make up the other 25%. Groundwater extractions commonly exceed groundwater replenishment; therefore, many of the region's aquifers are experiencing overdraft conditions.

Between 1985 and 1990, the average cost of surface water in the Bay Region is estimated at $15-$45 per acre-foot, about the average in California. The cost of groundwater in the Bay Region is estimated at $60-$130 per acre-foot, much higher compared to the Delta and Sacramento River Regions.

7.1.3.4 SACRAMENTO RIVER REGION

About 40% of irrigation water sources in the Sacramento River Region are from local water rights or local water projects. CVP project water and groundwater each make up about half of the remainder of the total agricultural water use. The 30% of the region's lands that are irrigated with groundwater generally have a very reliable supply.

Agricultural Land Use. Land uses in the Sacramento River Region are principally agricultural and open space, with urban development focused in the City of Sacramento. More than half the region's population lives in the greater metropolitan Sacramento area. Other fast-growing communities include Vacaville, Dixon, Redding, Chico, and various Sierra Nevada foothill towns. Urban development has occurred along major highway corridors in Placer, El Dorado, Yolo, Solano, and Sutter Counties, and has taken some irrigated agricultural land out of production. The suburban ranchette homes on relatively large parcels that surround many of the urban areas often include irrigated pastures or small orchards.

Historically, rice was the most important crop in the Sacramento River Region, accounting for 30% of the total irrigated acres. Almost 90% of California rice crops were grown in this region from 1946 to 1950. The next important crops in the Sacramento River Region were irrigated pasture and orchards, each accounting for 20% of the total irrigated acres.

Excluding the Delta portion of the Sacramento River Region, in 1996, approximately 2.4 million acres of important farmland were mapped in the Sacramento River Region (for areas covered by the DOC important farmland map series).

Agricultural Water Use. About 40% of irrigation water sources in the Sacramento River Region are from local water rights or local water projects. CVP project water and groundwater each make up about half of the remainder of the total agricultural water use. The 30% of the region's lands that are irrigated with groundwater generally have a very reliable supply.

The majority of diverters along the Sacramento and Feather Rivers existed before major CVP and SWP reservoirs were built. Between 1985 and 1990, the average cost of surface water in the Sacramento River Region is estimated at $0-$15 per acre-foot, among the

lowest costs in California. The cost of groundwater is estimated at $30-$60 per acre-foot, also among the lowest in the state.

7.1.3.5 SAN JOAQUIN RIVER REGION

Agricultural Land Use. Land uses in the San Joaquin River Region are predominantly grazing and open space in the mountain and foothill areas, and agricultural in the San Joaquin Valley area. Urban land use in 1996 totaled approximately 375,000 acres. Urban areas include the cities of Stockton, Fresno, Visalia, Modesto, Merced, and Tracy, as well as smaller communities such as Lodi, Galt, Madera, and Manteca. The western side of the region, south of Tracy, is sparsely populated. Small farming communities provide services for farms and ranches in the area, all relatively close to I-5.

Prior to the 1960s, land uses in the San Joaquin River Region were principally agriculture and open space, with urban uses limited to small farm communities. Although agriculture and food processing are still the region's major industries, expansion from the San Francisco Bay Area and local industrial growth over the past 30 years have resulted in the creation of major urban centers throughout the region.

Between 1946 and 1950, in terms of irrigated acres, cotton and grains were the most important crops in the San Joaquin River Region, accounting for 22% and 20% of the total irrigated acres, respectively. The next important crops in the San Joaquin River Region were irrigated pasture, alfalfa, and grapes, each accounting for about 15% of the total irrigated acres. Almost 100% of California cotton and 90% of California grapes were grown in this region from 1946 to 1950.

In 1996, excluding the Delta portion of San Joaquin County, about 3,751,000 acres of important farmland were mapped in the San Joaquin River Region (for areas that have been mapped by the DOC under important farmland criteria).

Agricultural Water Use. About 40% of irrigation water sources in the San Joaquin River Region are from local water rights or local water projects. CVP project water provides 35% of total irrigation water uses. The rest of the region's water is made up of approximately 10% from the SWP and 15% from groundwater pumping.

Between 1985 and 1990, the average cost of surface water in the San Joaquin River Region is estimated at $20-$85 per acre-foot, at the high end of cost in California. The cost of groundwater is estimated at $30-$80 per acre-foot, also at the high end of cost in the state.

About 40% of irrigation water sources in the San Joaquin River Region are from local water rights or local water projects. CVP project water provides 35% of total irrigation water uses. The rest of the region's water is made up of approximately 10% from the SWP and 15% from groundwater pumping.

7.1.3.6 OTHER SWP AND CVP SERVICE AREAS

Agricultural Land Use. Although the Other SWP and CVP Service Areas include California's most heavily urbanized areas, much of the region's land remains in agricultural uses. Intensive agriculture occurs in the Santa Maria and lower Santa Ynez Valleys. Moderate levels of agricultural activity also occur near the South Coast area, and much of the region

is grazed. Agricultural crops include grapes, vegetables, and truck crops, as well as a thriving flower seed industry. Important farmland mapped in the area totaled approximately 2.1 million acres in 1996 (for areas that have been mapped by the DOC under important farmland criteria).

Because agricultural land acreages and production are both reported on a county basis, acreages for the San Felipe Division of the CVP are shown under the Bay Region, rather than under the Other SWP and CVP Service Areas.

Between 1946 and 1950, in terms of irrigated acres, alfalfa and subtropical orchards were the most important crops in the region, accounting for 24% and 22% of the total irrigated acres, respectively. The next important crops in the region were truck crops, field crops, and grains, each accounting for about 15-20% of the total irrigated acres. Other crops grown in the region included pasture and orchards. Over 90% of California subtropical orchards was grown in this region during the 1950-1964 period. Development in the region has steadily increased since the 1880s.

The South Coast is the most urbanized region in all of California. Prime, statewide important, and unique farmland account for about 462,000 acres of the South Coast area. The largest amount of irrigated agriculture is in Ventura County, where about 112,000 acres of cropland are cultivated, including vegetables, strawberries, citrus fruit, and avocados.

Agricultural Water Use. Outside the Central Valley, SWP water and groundwater each provide 40% of the total irrigation water in the region. Local water provides the rest of total irrigation water uses.

Outside the Central Valley, SWP water and groundwater each provide 40% of the total irrigation water in the region. Local water provides the rest of total irrigation water uses.

Between 1985 and 1990, the average cost of surface water in the Other SWP and CVP Service Areas is estimated at $15-$255 per acre-foot, among the highest costs in California. The cost of groundwater is estimated at $80-$120 per acre-foot, also among the highest costs in the state.

Summary. The Program study area contains a large amount of productive agricultural lands, with over 9.5 million acres being mapped as important farmlands in 1996. Development of agriculture began in much of the study area as early as 1850. Today, rich soils, a beneficial climate, and a large array of water developments and flood protection projects provide the necessary inputs to support the state's highly productive agricultural lands. In many areas, however, the state's burgeoning population is reducing the amount of agricultural lands through conversion to urban uses. Water is supplied to the state's agriculture by the CVP (30%), the SWP (10%), local surface water projects (40%), and groundwater (10%).

7.1.4 ASSESSMENT METHODS

Agricultural land and water use impacts could occur in two main categories: direct and construction-related impacts, and indirect impacts.

Direct impacts are those changes in physical land and water uses or in land use designations that result from construction of new facilities or conversion of lands from one use to another. For this analysis, direct impacts are those that would occur if any of alternatives, or combinations of alternatives, are implemented.

Indirect effects occur later in time and could be farther removed in distance. Indirect land use effects include changes in broad land use policies, resources, or economies that could result from changes in land uses or in the long-term availability of water resources. Potential indirect and operations-related impacts of the Program include long-term changes in the number of acres in agricultural use.

As a Programmatic EIS/EIR, this assessment does not provide site-specific details or specific estimates of acreages potentially affected for a given alternative. Rather, potential increases or decreases in agricultural land uses by region are qualitatively estimated, or described with a range of gross acres. Given the level of detail appropriate for a programmatic assessment, project-level information is not available. This, in turn, means that this document cannot detail agricultural impacts, or benefits, in other than region-level acreages.

A programmatic-level analysis of the amount of water used by conversion of agricultural land for habitat purposes was made, using the methods and assumptions presented below.

The amount of water needed to support a particular land use is considered to be the amount of water that is supplied naturally by rainfall (soil moisture) and the water that must be applied for irrigation or to flood a wetland and supply evapotranspiration requirements. Evapotranspiration requirements of crops or other types of vegetation are variable. A monthly water budget can be used to estimate the evapotranspiration and corresponding applied water requirements of specific crops, given assumed soil moisture parameters and a monthly rainfall sequence. For this programmatic impact assessment, however, only the approximate differences in annual water requirements between those typical of existing conditions and those estimated for habitat restoration use were evaluated.

The amount of water needed to support a particular land use is considered to be the amount of water that is supplied naturally by rainfall (soil moisture) and the water that must be applied for irrigation or to flood a wetland and supply evapotranspiration (ET) requirements.

Open-water evaporation in the Delta Region of the Central Valley is approximately 5 acre-feet per year. [Note: Unless noted otherwise, "acre-feet" figures in this section refer to "acre-feet per acre per year."] Annual evapotranspiration from crops is generally less than open-water evaporation, although the annual evapotranspiration of perennial crops such as alfalfa may approach open-water evaporation. Average crop evapotranspiration for Delta lowlands and uplands is estimated to average about 3 acre-feet, with about 2 acre-feet of applied water needed for evapotranspiration (the remaining evapotranspira-tion is supplied from rainfall).

Wetlands evapotranspiration generally is considered about equal to open-water evaporation. The evapotranspiration rate for riparian vegetation with access to shallow groundwater could be similar to that of open-water evaporation. Very little of the evapotranspiration requirements of aquatic habitat is supplied from rainfall because rainfall occurs when the water supply conditions are not limited. Therefore, as much as

Open-water evaporation in the Delta Region of the Central Valley is approximately 5 acre-feet per year. Wetlands evapotranspiration generally is considered about equal to open-water evaporation.

3 acre-feet per year per acre of habitat of increased water supply may be needed if agricultural land is converted to aquatic or riparian habitats (5 acre-feet of evaporation required by aquatic habitats minus 2 acre-feet of applied water evapotranspiration required for crops). Where land is planted to crops that use more than 2 acre-feet of applied water for evapotranspiration (such as alfalfa or pasture), the water supply impacts of conversion to aquatic or riparian habitat would be less than 3 acre-feet. However, where the existing land use is natural vegetation, the water supply impacts would be higher (5 acre-feet) because existing applied water use would be zero.

Table 4.2 (in Chapter 4) provides estimated acres of habitat restoration in each of four geographic regions being proposed as part of the Ecosystem Restoration Program. This table was used to estimate impacts on water supply. Actual water supply impacts due to additional evapotranspiration water use by restored habitat lands would depend on monthly water supply conditions. If excess water is flowing from the Delta to the Bay, no impacts on water supply diversions or exports would occur. Water supply impacts in wet years would be low, because excess water supply conditions usually exist in many months during wet years. However, potential water supply impacts likely would occur in dry years because riparian and aquatic habitats use water even in dry years. These potential water supply impacts can be minimized by carefully selecting the areas for habitat restoration in order to control the amount of additional water supply needed to maintain the aquatic or riparian habitat, or by reducing the water applied to flooded seasonal wetlands in dry years.

Potential water supply impacts likely will occur in dry years because riparian and aquatic habitats use water even in dry years. These potential water supply impacts can be minimized by carefully selecting the areas for habitat restoration in order to control the amount of additional water supply needed to maintain the aquatic or riparian habitat, or by reducing the water applied to flooded seasonal wetlands in dry years.

7.1.5 SIGNIFICANCE CRITERIA

For this analysis, an impact on agricultural land or water use may be potentially significant if implementing a Program action would result in:

- Permanent or long-term reduction in agricultural acreage in a region or the conversion of any lands categorized as prime, state-wide important, or unique farmland.
- Adverse effects on agricultural resources or operations (for example, impacts on soils or farmland, or impacts from incompatible land uses).
- Any increase in groundwater pumping that would cause or exacerbate overdraft of a basin, which in turn leads to a conversion of farmlands to non-agricultural uses.
- Inconsistency with agricultural objectives of local, regional, and state plans.
- Conflicts with applicable environmental plans or policies adopted by agencies with jurisdiction over the project.
- Conflicts with general plan designations or zoning.
- Conversion of lands under the Williamson Act or other agricultural easement to an incompatible use.

7.1.6 NO ACTION ALTERNATIVE

7.1.6.1 DELTA REGION

Agricultural land conversion will significantly affect the Delta Region under the No Action Alternative. Between 1994 and 1996, the DOC's Farmland Mapping and Monitoring Program mapped a loss of 12,288 acres of prime, state-wide important, and unique agricultural lands in the five Delta counties. During this same 2-year period, 14,689 acres of agricultural lands in those five counties were committed by local governments to future urbanization and non-agricultural uses. This trend will continue under the No Action Alternative. A number of projects being carried out or proposed independent of the Program would convert agricultural land in the Delta, including the Stone Lakes NWR, the North Delta NWR, and the Yolo Basin Wildlife Area. Together, the three wildlife area proposals could convert up to 51,000 acres of agricultural land to wildlife uses. DWR estimates that levee failures in the Delta Region will result in continued, and even accelerated, flooding of tracts that are currently in agricultural use. Specific agricultural land use impacts would depend on the actual location of the modifications and improvements to be implemented under the No Action Alternative.

Agricultural land conversion will significantly affect the Delta Region under the No Action Alternative.

7.1.6.2 BAY REGION

Agriculture in the Bay Region will continue to experience the impacts of urban conversion under the No Action Alternative. Between 1994 and 1996, local governments committed 10,761 acres to future urbanization and non-agricultural use.

Agriculture in the Bay Region will continue to experience the impacts of urban conversion under the No Action Alternative.

7.1.6.3 SACRAMENTO RIVER AND SAN JOAQUIN RIVER REGIONS

Conversion of agricultural lands to urban uses will continue, and possibly accelerate, as the Sacramento, Stockton, Fresno, and Bakersfield metropolitan areas continue to expand, as well as dozens of smaller cities. It has been estimated that up to 1 million acres of agricultural land in the Central Valley could be converted within the next 40 years. Other activities will substantially affect agricultural resources under the No Action Alternative. Water currently being used for irrigation purposes could be diverted to provide protection for currently endangered species or for newly listed species. Although the exact amount of this water loss cannot be quantified due to varying habitat demands and the recovery or decline of the species involved, the amount could be substantial. The significance of this water loss to agriculture would be magnified by the lack of any additional water efficiency, surface storage, conveyance improvements, or conjunctive use programs. Water rights purchase and water transfer programs will occur with greater frequency as urban areas view irrigation water as a cheap alternative for accommodating growing populations. These transfers and purchases may be unregulated, or only lightly regulated, and may substantially affect exporting regions. County ordinances to strengthen area-of-origin

Conversion of agricultural lands to urban uses will continue, and possibly accelerate, as the Sacramento, Stockton, Fresno, and Bakersfield metropolitan areas continue to expand, as well as dozens of smaller cities.

water rights may reduce this effect to some extent. In addition, it is estimated that 45,000 acres of drainage problem lands in the San Joaquin River Region will be retired by 2020.

Table 7.1-4 summarizes the agricultural water use in the Central Valley before and after water was reallocated according to the CVPIA. This table illustrates how changes in surface water delivery correspond to changes in groundwater pumping. The estimates indicate that part of any change in surface water delivery is likely to be offset by a change in groundwater use. The degree of replacement depends on the relative cost of groundwater and surface water, and on the relative cost and benefit of other potential adjustments (for example, changing the amount of acreage irrigated or the irrigation methods).

Table 7.1-4. Substitutions for Groundwater for Surface Water in the Central Valley—before and after CVPIA Reallocation of Water

SOURCE	AGRICULTURAL WATER USE—2020 CONDITION WITHOUT CVPIA (TAF/year)	CHANGE DUE TO CVPIA DEDICATED WATER FOR RESTORATION (TAF/year)
Sacramento Region		
Surface water	4,524	-39
Groundwater	2,603	25
Total applied	7,127	-14
San Joaquin River Region		
Surface water	4,453	-302
Groundwater	3,427	134
Total applied	7,880	-168

Notes:
TAF = Thousand acre-feet.

These estimates were based on regions defined in the CVPIA Programmatic Environmental Impact Statement (EIS) and are shown as an example, based on estimates for the Programmatic EIS Alternative 1.

7.1.6.4 Other SWP and CVP Service Areas

As with the balance of the state, agriculture in the Other SWP and CVP Service Areas would be heavily affected by urban conversion. As with regions in the Central Valley, water costs likely would increase, and supplies would become more tenuous.

Agriculture in the Other SWP and CVP Service Areas would be heavily affected by urban conversion. As with the Central Valley regions, water costs likely would increase, and supplies would become more tenuous.

Summary. Under the No Action Alternative, agricultural land conversions, both to urban uses and to habitat uses, would be substantial. Throughout the Program study area, it is estimated that urbanization may convert over 1 million acres of agricultural lands within the next 40 years. A total of 45,000 acres of drainage-impaired lands may be retired, and over 50,000 acres of agricultural land may be converted to habitat use in existing and

planned wildlife areas. Other areas of agricultural land likely would be lost due to levee failures in the Delta. Irrigation water reliability likely would be reduced due to diversion to support endangered species and from water transfers.

7.1.7 CONSEQUENCES: PROGRAM ELEMENTS COMMON TO ALL ALTERNATIVES

For agricultural land and water use, the environmental consequences of the Ecosystem Restoration, Water Quality, Levee System Integrity, Water Use Efficiency, Water Transfer, and Watershed Programs, and the Storage element are similar under all Program alternatives, as described below. The environmental consequences of the Conveyance element vary among Program alternatives, as described in Section 7.1.8.

7.1.7.1 ALL REGIONS

Conversion of prime, state-wide important, or unique farmland to other uses likely would conflict with many local or regional agricultural land use plans or policies, which would result in a potentially significant unavoidable impact. For example, agricultural policies in the five Delta county general plans contain the following statements:

Conversion of prime, state-wide important, or unique farmland to other uses likely would conflict with many local or regional agricultural land use plans or policies, which would result in a potentially significant impact.

- Yolo County: "It is the policy of Yolo County to vigorously conserve and preserve the agricultural lands in Yolo County. Yolo County shall protect and conserve agricultural land use especially in areas presently farmed or having prime agricultural soils and outside of existing planned urban communities and outside of city limits. Nonagricultural land use activities are prohibited from agriculturally designated areas in Yolo County."

- Solano County: "Preserve and maintain essential agricultural lands including intensive agricultural areas comprised of high quality soils and irrigated lands and extensive agricultural areas with unique or significant dryland farming or grazing activities."

- Sacramento County: "The County shall balance the protection of prime farmland and farmland with intensive agricultural investments with the preservation of natural habitat realized by the establishment of environmental mitigation banks and sites, wildlife refuges and other natural resource preserves so as to protect farmland and to conserve associated habitat values."

- San Joaquin County: "Agricultural areas shall be principally used for crop production, ranching and grazing."

- Contra Costa County: "County Agricultural Resources Goal 8-H: To conserve prime agricultural land outside the Urban Limit Line exclusively for agriculture."

The specific locations of projects have not been identified for this programmatic-level analysis. However, it is likely that lands designated for agriculture in county and city general plans would be used for storage, conveyance, habitat, and levee purposes. Thus, inconsistency with these plans would result in a potentially significant adverse impact on agricultural land use.

It is also likely that a substantial amount of the agricultural land that the various programs could convert would be enrolled in the California Land Conservation Act, known as the Williamson Act. Under the Williamson Act, landowners contract with their city or county to keep lands in farming or open space for a minimum of 10 years. In return, the landowner receives a reduction in property taxes. The State makes subvention payments to local governments with Williamson Act contracts to defray a portion of the foregone property taxes. State or local agencies acquiring Williamson Act-contracted lands are required to notify the DOC beforehand and, in the case of prime farmland, to make findings that no other non-contracted land is feasible for the proposed use. However, these findings are not required for fish and wildlife enhancement projects or flood control projects, which are defined in the Act as compatible with agricultural preserves. Also exempted from this requirement are projects designated as State Water Facilities. Although the conversion of agricultural lands enrolled in the Williamson Act is often used as an indicator of significance, projects from both the Ecosystem Restoration Program and the Levee System Integrity Program likely would be compatible with the Act. Williamson Act-contracted lands may also be acquired for other Program purposes, such as storage and conveyance. The loss of Williamson Act-contracted land for any of these program purposes is considered a potentially significant impact.

Although the conversion of agricultural lands enrolled in the Williamson Act is often used as an indicator of significance, projects from both the Ecosystem Restoration Program and the Levee System Integrity Program likely would be compatible with the Act.

7.1.7.2 DELTA REGION

Ecosystem Restoration Program

The Ecosystem Restoration Program involves conversion of land in the Delta Region to habitat and ecosystem restoration, levee setbacks, and floodways. In general, agriculture is the dominant land use on the nonconveyance side of levee structures in the Delta. The Ecosystem Restoration Program could convert up to 112,000 acres of important farmland. Although some of these agricultural uses may be shifted to the Central Valley or elsewhere, this conversion is a potentially significant unavoidable adverse impact on agricultural land use.

Habitat restoration in the Delta Region could affect water supply because some aquatic habitats use more water for evapotranspiration than current agricultural land uses. Shoal and mid-channel island habitat restoration would not require additional water nor would perennial grasslands, which were assumed to be sustained by natural rainfall. Seasonal wetlands on lands that will continue agricultural practices generally use water in fall and winter when evaporation is relatively low. Therefore, the water requirements for flooding these areas may be less (1 or 2 acre-feet per acre per year) than for other aquatic habitats. The 30,000 acres of seasonal wetland restoration targeted for the Delta Region therefore

Habitat restoration in the Delta Region could affect water supply because some aquatic habitats use more water for evapotranspiration than current agricultural land uses.

could require 30,000-60,000 acre-feet per year of additional water (see Table 4-2 in Chapter 4).

The remaining aquatic and riparian habitat restoration targets from Table 4-2 for the Delta Region total between 55,600 and 73,600 acres. If we assume that all this habitat is developed on existing agricultural land, as much as 3 acre-feet per acre (5 acre-feet for wetlands minus 2 acre-feet for agricultural land) would be needed. Therefore, a maximum of between 166,800 and 220,800 acre-feet per year of additional water supply could be needed in the Delta Region for tidal and nontidal habitat restoration. The maximum potential additional water use for Delta Region habitat restoration therefore could range from 196,800 to 280,800 acre-feet per year. However, some of the tidal habitat restoration identified in Table 4-2 (in Chapter 4) would involve dredging or filling existing open-water habitat to create shallow-water or slough habitat, which would not affect water supply because the restored habitat already is open water.

Effects on other water users cannot be determined until the location and other specific details of the habitat restoration are known.

Water Quality Program

Since the CVP and SWP are required to maintain water quality standards in the Delta, it is likely that impacts on Delta water users would be minimal. The long-term benefits of the Water Quality Program include improved water quality conditions, which would benefit agricultural users. Because it is anticipated that up to 45,000 acres of land in the Grasslands Subarea of the San Joaquin River Region with drainage problems would be retired under the No Action Alternative, this land retirement under the Program is not considered a potentially significant impact compared to the No Action Alternative.

The long-term benefits of the Water Quality Program include improved water quality conditions.

Levee System Integrity Program

Levee system integrity measures could affect up to 35,000 acres of land in the Delta, most of which would likely be important agricultural land. The specific locations of lands that would be affected by the Preferred Program Alternative are not known at this time. The Levee System Integrity Program primarily would affect agricultural land uses in the Delta Region and would not directly affect land uses in the other four regions. Again, protection of flood-threatened agricultural lands due to levee improvements is considered a beneficial impact.

No impacts on agricultural land and water use from the Levee System Integrity Program are anticipated in any Program region other than the Delta. The Levee System Integrity Program is not discussed below for the other Program regions.

Water Use Efficiency Program

The Water Use Efficiency Program is not anticipated to directly affect land use. However, the program may indirectly affect agricultural land use. The flexibility to grow different

Agricultural land may be removed from irrigated production because of increased costs and decreased profitability, which could result from required efficiency improvements or increased district water charges.

crops in order to respond to market demand may be reduced due to higher costs for water and water infrastructure. Improved efficiency may allow the continued viability of agriculture in some areas. Efficiency improvements that result in greater water supply reliability but also higher annual cost may cause a shift in the types of crops grown, such as to higher value crops that justify the increased water cost. A shift to high-value crops may lead to a sustained, less-flexible water demand. Improvement in the long-term viability of some agricultural lands is a benefit.

Water Transfer Program

The Water Transfer Program could affect agricultural land use primarily through changes in agricultural, open space, habitat, and developed land use. In addition to the source of water for a transfer, the timing, magnitude, and pathway of each transfer can substantially affect the potential for significant impacts. The water source varies according to the water transfer category: crop fallowing (surface water or groundwater), shifting to a crop with a lower water demand (surface water or groundwater), groundwater substitution for surface water (surface water), direct groundwater transfers (groundwater), conserved water (surface water or groundwater), and stored water in reservoirs (surface water).

Water transfers are not expected to directly affect land use; however, they could indirectly affect agricultural opportunities by changing the availability of water in selling and receiving areas.

Beneficial impacts are associated with the transferred water's destination and include: (1) increasing agricultural acreage in areas with limited water supplies, and (2) increasing habitat acreage in areas with limited water supplies.

Potentially significant adverse impacts associated with the transferred water include: (1) decreasing agricultural acreage due to crop fallowing, (2) decreasing agricultural acreage due to increased costs resulting from direct groundwater or groundwater replacement transfers, (3) causing land use changes that could be inconsistent with local agricultural objectives, (4) decreasing habitat acreage, and (5) decreasing agricultural acreage due to transfer-induced groundwater overdraft. Mitigation could reduce these impacts.

Water transfers are not expected to directly affect land use; however, they could indirectly affect agricultural opportunities by changing the availability of water in selling and receiving areas. Transfers could result in adverse economic effects due to temporary or longer term reduction in cropped lands or shift in crop types.

Watershed Program

The Delta Region could receive better quality irrigation water as a result of Watershed Program activities. As upstream watersheds are managed to create less erosion and sedimentation, and to improve water quality, these waters eventually will reach the Delta with fewer sediments and pollutants.

Storage

Potentially significant and unavoidable adverse impacts on existing land uses could result from land conversions associated with new or expanded surface water storage. Specific land use impacts would depend on the location of any new storage facilities. For this programmatic analysis, it was assumed that the most likely new or enlarged reservoir sites would be in the foothills rather than in flat, valley-bottom areas where agricultural land uses would occur. Therefore, storage elements likely would affect less intensively used agricultural lands, such as grazing lands, and not the better farmland generally found on the valley floor. All Program alternatives however, include the possibility of in-Delta storage, which could result in potentially significant impacts on agricultural lands in the region. Up to 15,000 acres of Delta agricultural lands could be affected by this Program element. Potentially, water supplies available from new storage facilities could be used for agricultural purposes, which is considered a potential benefit.

Potentially significant and unavoidable adverse impacts on existing land uses could result from land conversions associated with new or expanded surface water storage.

7.1.7.3 BAY REGION

Ecosystem Restoration Program

Habitat restoration in the Bay Region has a low potential to affect water supply because water from the San Francisco Bay, which would be used to maintain the restored habitat, is not otherwise used for water supply. The additional evapotranspiration resulting from conversion of land to tidal or nontidal wetlands would not cause any decrease in freshwater supplies. Potential impacts on important agricultural land in the Bay Region are anticipated to be minimal because project features are planned to be located mostly on tidal or other nonagricultural lands.

Habitat restoration in the Bay Region has a low potential to affect water supply because water from the Bay, which would be used to maintain the restored habitat, is not otherwise used for water supply.

Watershed, Water Transfer, Water Quality, and Water Use Efficiency Programs

No impacts on agricultural land and water use in the Bay Region are anticipated from implementation of any of these programs.

Storage

Agricultural water users in the Bay Region could receive some of the additional water supply developed by the Preferred Program Alternative, which is considered a beneficial impact.

7.1.7.4 SACRAMENTO RIVER REGION

Ecosystem Restoration Program

The Ecosystem Restoration Program could convert up to 34,000 acres of important farmland, primarily on the east side of the valley and the valley trough in the Sacramento Valley.

Habitat restoration in the Sacramento River Region may not require as much additional water per acre of habitat as the Delta Region because much of the floodplain and meander corridor vegetation would be sustained by soil moisture and shallow groundwater storage resulting from rainfall, snowmelt, and storm flows. Because current agricultural water use is likely to be similar to the additional riparian water supply needed to sustain riparian corridor habitat restoration efforts, relatively small water supply impacts likely would result from these restoration activities. However, if riparian habitat is restored from natural areas not fully supporting riparian habitat, a water supply impact of up to 2 acre-feet per acre per year of riparian habitat could result. If all of the potential 34,000 acres of riparian restoration were created from these types of natural vegetation lands, which is unlikely, a maximum of 68,000 acre-feet per year of additional water would be required in the Sacramento River Region.

Habitat restoration in the Sacramento River Region may not require as much additional water per acre of habitat as the Delta Region because much of the flood-plain and meander corridor vegetation would be sustained by soil moisture and shallow groundwater storage resulting from rainfall, snow melt, and storm flows.

Water Quality Program

The Water Quality Program may provide better quality irrigation water in the Sacramento River Region as mercury and heavy-metal drainage problems are addressed.

The Water Quality Program may provide better quality irrigation water in the Sacramento River Region as mercury and heavy-metal drainage problems are addressed.

Water Use Efficiency and Water Transfer Programs

Potential impacts related to agriculture in the Sacramento River Region from Water Use Efficiency and Water Transfer Program actions would be similar to those discussed for the Delta Region.

Watershed

Potential watershed activities in the Sacramento River Region would be compatible with applicable agricultural land use plans and policies in their affected jurisdictions. Watershed activities could improve grazing land conditions and grazing use, potentially resulting in a beneficial impact.

Storage

Storage facilities could result in conversion of agricultural land in the foothill or mountain areas in the Sacramento River Region, a potentially significant and unavoidable adverse

Storage facilities could result in conversion of agricultural land in the foothill or mountain areas in the Sacramento River Region, a potentially significant and unavoidable adverse impact. Development of storage facilities also could conflict with local and regional plans regarding agricultural lands.

impact. Development of storage facilities also could conflict with local and regional plans regarding agricultural lands. Some agricultural land, which could be classified as locally important or grazing lands, could be affected by the Storage Program elements, a potentially significant and unavoidable adverse impact. Because storage facility locations have not been selected, the amount of important farmland affected is not known and will be determined in future project-specific environmental documentation.

Because potential new or enlarged reservoir sites would be located primarily in the foothills and would affect dryland crops and grasslands that rely on rainfall, changes in applied water have not been estimated.

Agricultural water users in the Sacramento River Region could receive some of the additional water supply developed by the Program alternatives. However, the cost and availability of water from new storage and conveyance facilities will depend on the alternative selected, the location of facilities proposed, and amount of new water from each of these facilities. Neither a cost analysis nor a willingness-to-pay study has been completed. Consequently, the allocation of new water by region is uncertain.

Groundwater storage projects in the Sacramento River Region could affect adjacent agricultural operations.

Groundwater storage projects in the Sacramento River Region could affect adjacent agricultural operations. Particularly in dry years, groundwater level declines could occur as a result of overpumping in storage facilities. In extreme cases, the use of wells on adjacent or nearby properties could be lost due to adverse groundwater quality or lower groundwater levels. Temporary loss of groundwater availability, or increased pumping costs, could result in adverse economic effects on neighboring agricultural lands. These effects are discussed in Section 7.2, "Agricultural Economics." Groundwater storage facilities could provide a benefit to neighboring agricultural operations by ensuring that adequate supplies of groundwater are available and by reducing pumping costs in most years as groundwater levels remain higher.

7.1.7.5 SAN JOAQUIN RIVER REGION

Ecosystem Restoration Program

Because current agricultural water use is likely to be similar to the additional riparian water supply needed to sustain riparian corridor habitat restoration efforts, relatively small water supply impacts likely would result from these restoration activities.

The Ecosystem Restoration Program could convert up to 5,800 acres of important farmland, primarily east of the San Joaquin River in the San Joaquin River Region.

Habitat restoration in the San Joaquin River Region may not require as much additional water per acre of habitat as the Delta Region because much of the floodplain and meander corridor vegetation would be sustained by soil moisture and shallow groundwater storage resulting from rainfall, snowmelt, and storm flows. Because current agricultural water use is likely to be similar to the riparian water supply needed to sustain riparian corridor habitat restoration efforts, relatively small water supply impacts likely would result from these restoration activities. However, if riparian habitat is restored from natural areas not fully supporting riparian habitat, a water supply impact of up to 2 acre-feet per acre of riparian habitat could result. If all of the potential 5,800 acres of riparian restoration were created from these types of natural vegetation lands, which is unlikely, a maximum of

11,600 acre-feet per year of additional water would be required in the San Joaquin River Region.

Water Quality Program

As proposed in the Water Quality Program, up to 37,000 acres of agricultural land with water quality problems (for example, the presence of selenium) may be idled in the Grasslands Subarea of the San Joaquin River Region as a measure to improve water quality in the region and in the Delta. The exact location of these lands and, consequently, the types of crops that would be idled are not known. Therefore, the Water Quality Program could affect up to 37,000 acres of agricultural land, possibly including prime, state-wide important, and unique farmland. This loss is considered potentially significant and unavoidable. It should be noted that 45,000 acres of land would be retired under the No Action Alternative, compared to 37,000 acres of land that would be retired under the Preferred Program Alternative.

Up to 37,000 acres of agricultural land with water quality problems (for example, the presence of selenium) may be idled in the Grasslands Subarea of the San Joaquin River Region as a measure to improve water quality in the region and in the Delta.

Again, the location and mix of crops that would be retired as part of the Water Quality Program is not definable at the programmatic level. But assuming an average of 3 acre-feet of applied water per crop acre and a maximum of 37,000 acres of drainage problem lands idled, approximately 111,000 acre-feet of water would not be applied. As discussed for the Delta Region, this reduction in applied water does not necessarily equate to new water available for other uses. ("New water" is water not previously available, created by reducing irrecoverable losses or outflow to the ocean or inland salt sinks.) Some of this water would likely be recoverable in the San Joaquin River Region by downstream or in-basin users.

"New water" is water not previously available, created by reducing irrecoverable losses or outflow to the ocean or inland salt sinks.

Water Use Efficiency and Water Transfer Programs

Impacts on agriculture in the San Joaquin River Region associated with Water Use Efficiency and Water Transfer Program actions would be similar to those discussed for the Delta Region.

Watershed Program

Potential watershed activities in the San Joaquin River Region would be compatible with applicable agricultural land use plans and policies in their affected jurisdictions. Watershed activities could improve grazing land conditions and grazing use, potentially resulting in a beneficial impact.

Storage

Storage facilities could result in conversion of agricultural land in the foothill or mountain areas in the San Joaquin River Region, a potentially significant and unavoidable adverse

Storage facilities could result in conversion of agricultural land in the foothill or mountain areas in the San Joaquin River Region, a potentially significant and unavoidable adverse impact. Development of storage facilities also could conflict with local and regional plans regarding agricultural lands.

impact. Development of storage facilities also could conflict with local and regional plans regarding agricultural lands. Some agricultural land, which could be classified as locally important or grazing lands, could be affected by the Storage element. Because storage facility locations have not been selected, the amount of important farmland affected is not known and would be determined in project-specific environmental documentation.

Because potential reservoir sites would be sited primarily in the foothills and would affect dryland crops and grasslands that rely on rainfall, changes in applied water have not been estimated.

Agricultural water users in the San Joaquin River Region could receive some of the additional water supply developed by the Preferred Program Alternative. However, the cost and availability of water from new storage and conveyance facilities will depend on the alternative selected, the location of facilities proposed, and amount of new water from each of these facilities. Neither a cost analysis nor a willingness-to-pay study has been completed. Consequently, the allocation of new water by region is uncertain.

Groundwater storage projects in the San Joaquin River Region could affect adjacent agricultural operations. Particularly in dry years, groundwater level declines could occur as a result of overpumping in storage facilities. In extreme cases, the use of wells on adjacent or nearby properties could be lost due to adverse groundwater quality or lower groundwater levels. Temporary loss of groundwater availability, or increased pumping costs, could result in adverse economic effects on neighboring agricultural lands. Groundwater storage facilities could provide a beneficial effect on neighboring agricultural operations, by ensuring that adequate supplies of groundwater are available and by reducing pumping costs in most years as groundwater levels remain higher.

Groundwater storage projects in the San Joaquin River Region could affect adjacent agricultural operations.

7.1.7.6 Other SWP and CVP Service Areas

Ecosystem Restoration, Water Quality, and Watershed Programs

No impacts on agricultural land and water use in the Other SWP and CVP Service Areas are associated with Ecosystem Restoration, Water Quality, or Watershed Program actions.

Water Use Efficiency Program

Indirect changes in land use in the Other SWP and CVP Service Areas may result from the Water Use Efficiency Program. Improved efficiency may allow the continued viability of agriculture in some areas, which will tend to maintain the existing uses of agricultural lands in some regions and reduce the amount that may go out of production or become urbanized. Efficiency improvements that result in greater water supply reliability but also in higher annual cost may cause a shift in the types of crops grown. Improvement in the long-term viability of some agricultural lands would be a potential beneficial impact.

Water Transfer Program

The Other SWP and CVP Service Areas would primarily be recipients of water transferred from the Sacramento River and San Joaquin River Regions. However, transfers of water within this region are possible. If such transfers occur, impacts would be similar to those described for the Delta Region and would depend on whether a particular area is buying or selling water.

The Other SWP and CVP Service Areas could receive water transferred from other regions, but cost may be a limiting factor.

Storage

Potential direct impacts on agricultural land in the Other SWP and CVP Service Areas are anticipated to be minimal and have not been quantified because few agricultural areas would be directly affected by Storage Program features. Agricultural water users in the region could receive some of the additional water supply developed by the Preferred Program Alternative; however, the cost of this water supply may limit its use for agricultural purposes.

7.1.8 CONSEQUENCES: PROGRAM ELEMENTS THAT DIFFER AMONG ALTERNATIVES

For agricultural land and water resources, the Conveyance element results in environmental consequences that differ among the alternatives, as described below.

7.1.8.1 PREFERRED PROGRAM ALTERNATIVE

This section includes a description of the consequences of a pilot diversion project. If the pilot project is not built, these consequences would not be associated with the Preferred Program Alternative.

Delta Region

In the Delta Region, channel widening could require conversion of up to 4,900 acres of agricultural land. Adverse land use impacts of the modifications are considered potentially significant. To the extent that dredging reduces the amount of land that setback levees require, dredging could result in a lesser impact than setback levees but impacts would remain potentially significant. If dredged spoils are disposed of on agricultural lands, a potentially significant adverse impact could result by placing lower quality materials over prime, state-wide important, or unique farmland.

To the extent that dredging reduces the amount of land that setback levees require, dredging could result in a lesser impact than setback levees but impacts would remain potentially significant.

Building a diversion facility from near Hood to the Mokelumne River would result in a potentially significant and unavoidable adverse land use impact from permanent conversion of important farmlands.

Changes in project operations are not anticipated to adversely affect agricultural land and water use. Water supply is not expected to be affected in the Delta Region; therefore, impacts on agricultural land and water use resources associated with water supply are not anticipated in the region.

Bay Region

No impacts on agricultural land and water use are anticipated in the Bay Region from the Conveyance element.

Sacramento River Region

In the Sacramento River Region, some agricultural lands could be converted as a result of connector canals from new storage facilities to existing conveyance facilities. Changes in project operations are not anticipated to adversely affect agricultural land and water use in the Sacramento River Region. Water supply is not expected to be affected in the Sacramento River Region; therefore, impacts on agricultural land and water use resources associated with water supply are not likely.

In the Sacramento River Region, some agricultural lands could be converted as a result of connector canals from new storage facilities to existing conveyance facilities.

San Joaquin River Region

Some agricultural lands in the San Joaquin River Region could be converted as the result of connector canals from new storage facilities to existing conveyance facilities. Changes in project operations may affect agricultural land and water use in the San Joaquin River Region. Any increases in water supply caused by changes in the amount of water exported to the region could result in a beneficial effect, depending on the magnitude of the increase and the timing.

Some agricultural lands in the San Joaquin River Region could be converted as the result of new connector canals.

Other SWP and CVP Service Areas

Changes in project operations may affect agricultural land and water use. Any reductions in water supply caused by changes in the amount of water exported to the Other SWP and CVP Service Areas could result in a potentially significant adverse impact, depending on the magnitude of the reduction. Any increases in water supply reliability caused by changes in the amount of water exported to this region could result in a beneficial impact, depending on the magnitude of the increase.

7.1.8.2 ALTERNATIVE 1

Because Alternative 1 does not include a pilot diversion facility near Hood or levee setbacks on the Mokelumne River, the amount of agricultural lands converted would be somewhat less than for the Preferred Program Alternative. Nevertheless, the impact on agricultural land use is considered potentially significant.

Because the No Action Alternative also would involve loss of existing agricultural lands, the impact when compared to current conditions would be greater.

7.1.8.3 ALTERNATIVE 2

Impacts on agricultural land use under Alternative 2 would be similar to those described for the Preferred Program Alternative.

7.1.8.4 ALTERNATIVE 3

Impacts on agricultural land use under Alternative 3 would be slightly greater than those of the Preferred Program Alternative because of the additional impacts associated with construction of an isolated facility.

7.1.9 PROGRAM ALTERNATIVES COMPARED TO EXISTING CONDITIONS

7.1.9.1 PREFERRED PROGRAM ALTERNATIVE

This section presents the comparison of the Preferred Program Alternative, and Alternatives 1, 2, and 3 to existing conditions. This programmatic analysis found that the potentially beneficial and adverse impacts from implementing any of the Program alternatives when compared to existing conditions were the same impacts as those identified in Sections 7.1.7 and 7.1.8, which compare the Program alternatives to the No Action Alternative. The only exception to this statement is that retirement of drainage-impaired lands, some of which are important farmlands, is contemplated in both the No Action Alternative and all the Program Alternatives. However, the Preferred Program Alternative could retire 37,000 acres, rather than the 45,000 acres that are of drainage-impaired lands contemplated under the No Action Alternative. Therefore, when compared to existing conditions, the Preferred Program Alternative would result in somewhat lesser impact on retirement of drainage-impaired lands than under the No Action Alternative.

The benefits to agricultural land and water resources would be greater water supply reliability, increased irrigation water quality, and increased protection of Delta agriculture from levee failure flooding under each of the alternatives (Preferred Program Alternative

The benefits to agricultural land and water resources would be greater water supply reliability, increased irrigation water quality, and increased protection of Delta agriculture from levee failure flooding under each of the alternatives than under existing conditions.

and Alternatives 1, 2, and 3) than under existing conditions. The overall benefits under each of these four alternatives is likely to be somewhat greater than the benefits to agricultural land and water resources under the No Action Alternative.

At the programmatic level, the comparison of Program alternatives to existing conditions did not identify any additional potentially significant environmental consequences than were identified in the comparison of Program alternatives to the No Action Alternative—again, except for the retirement of drainage-impaired land.

The following potentially significant unavoidable impacts, as indicated by the bold font, are associated with the Preferred Program Alternative:

- **Conversion of prime, state-wide important, and unique farmlands to project uses**
- **Conflicts with local government plans and policies**
- **Conflicts with adjacent land uses**

7.1.9.2 ALTERNATIVE 1

Impacts on agricultural land and water use under Alternative 1 compared to existing conditions would be similar to those described for the Preferred Program Alternative, without impacts associated with converting lands for the pilot diversion facility near Hood.

7.1.9.3 ALTERNATIVE 2

Impacts on agricultural land and water use under Alternative 2 would be similar to those described for the Preferred Program Alternative.

7.1.9.4 ALTERNATIVE 3

Impacts on agricultural land and water use under Alternative 3 compared to existing conditions would be similar to those described for the Preferred Program Alternative, but somewhat greater because construction of an isolated facility would require converting larger amounts of agricultural land. The isolated conveyance facility also would tend to increase salinity in south and central Delta areas. This decrease in water quality could negatively affect agricultural water users in these areas of the Delta, potentially reducing crop yields and crop flexibility.

7.1.10 ADDITIONAL IMPACT ANALYSIS

Cumulative Impacts. A long-term trend in the Program study area has been conversion of agricultural lands to other, primarily urban, uses. As an example, between 1994 and 1996, the five Delta counties lost 12,288 acres of prime, state-wide important, and unique agricultural lands. Most of this loss occurred as a result of urbanization of farmland in and near cities in the five-county area. During this same 2-year period, 14,689 acres of agricultural lands in those five counties were committed, largely through the planning process, to future urbanization and nonagricultural uses. Statewide, between 1994 and 1996, over 55,000 acres of agricultural lands in these categories (for areas covered by the DOC's important farmland map series) have been converted, mostly to urban uses. Between 1993 and 1995, some 71,000 acres of Williamson Act-contracted lands were converted to public improvements statewide, of which about half were for habitat and other public open space uses. Mitigating these losses to some extent is the creation of new agricultural lands, in particular the creation of new unique farmland through the planting of grape vines in foothill and valley terrace areas. Urbanization of farmland in the Central Valley and foothill areas is expected to continue into the foreseeable future. Population projections for 2020 show California's population at 47.5 million, a substantial increase over the 1995 level of 32.1 million.

A long-term trend in the Program study area has been conversion of agricultural lands to other, primarily urban, uses.

One study found that population in the Central Valley is expected to triple by 2040, putting tremendous pressure on agricultural lands. The study concluded that low-density urban development could consume more than 1 million acres of farmland by 2040. Even if more compact urban development occurred, over 474,000 acres of farmland still would be converted to urban uses. Another study that projected land use patterns based on population growth found that an additional 331,530 acres of urbanized land would be required (a 37% increase by 2005) if full development in the 12-county Bay-Delta region occurred, including affecting 39,511 acres of mostly farmed wetlands in the Delta.

One study found that population in the Central Valley is expected to triple by 2040, putting tremendous pressure on agricultural lands.

Other water-related initiatives that are not part of the Program, such as the CVPIA, have reduced water availability to agriculture, potentially idling cropland or forcing a change to lower value crops (see Section 5.1 for a discussion of water supply reliability). Wildlife habitat projects outside or only partially within the Program, including the Yolo Basin Wildlife Area, the Stone Lakes NWR, and the proposed North Delta NWR, potentially could convert up to 51,000 additional acres of prime, state-wide important, or unique farmland from agricultural production to habitat.

While many would argue that conversion of agricultural lands to habitat or other non-urban uses is preferable to agricultural loss from urbanization, cumulative impacts on agriculture in the project area—from the Program and other causes—are considered potentially significant. The maximum foreseeable loss over the 20- to 30-year span of the Program would total 243,000 acres of important farmland converted to Program uses. All the Program alternatives would contribute to the trend of agricultural land conversion, by creating wildlife habitat, larger levees, and water storage and conveyance facilities on lands in agricultural production.

While many would argue that conversion of agricultural lands to habitat or other non-urban uses is preferable to agricultural loss from urbanization, cumulative impacts on agriculture in the project area—from the Program and other causes—are considered potentially significant.

Growth-Inducing Impacts. The Preferred Program Alternative would provide better quality municipal water, in sufficient quantities and reliability to accommodate projected population growth. As this growth occurs, housing, business, and infrastructure necessary to support additional population could be built on existing agricultural lands. To the extent that the water quality and quantity supplied by the Program allow this growth to occur, the Program could be considered to induce growth. In addition, increased prices for agricultural water could make continued farm production marginal in some areas, as could the opportunity to transfer water elsewhere. The result from either of these cases could be an increased desire on the part of an agricultural landowner to sell property for urban uses. In localized areas, increased incentives to sell agricultural property for urban uses also could be considered a growth-inducing impact of the Program.

The Program would provide better quality municipal water, in sufficient quantities to accommodate projected population growth.

Short- and Long-Term Relationships. The long-term productivity of agricultural lands used for levee, conveyance, or habitat purposes by the Program would be lost to agricultural production. In addition, some agricultural lands may be adversely affected by construction impacts in the short term. Many of the Program features, however, will enhance the long-term productivity of other agricultural lands in the state. Increases in irrigation water quality, water supply reliability, and efficient use, in addition to protection from levee failure, would tend to increase the productivity of farmland in the Program area.

All Program alternatives would directly and indirectly convert prime, state-wide important, and unique agricultural lands to conveyance, storage, levee, and habitat uses.

Irreversible and Irretrievable Commitments. All Program alternatives would directly and indirectly convert prime, state-wide important, and unique agricultural lands to conveyance, storage, levee, and habitat uses. This is an irreversible and irretrievable commitment of these resources.

All Program alternatives would directly and indirectly convert prime, state-wide important, and unique agricultural lands to conveyance, storage, levee, and habitat uses.

7.1.11 MITIGATION STRATEGIES

These mitigation strategies will be considered during project planning and development. Specific mitigation measures will be adopted, consistent with the Program goals and objectives and the purposes of site-specific projects. Not all mitigation strategies will be applicable to all projects because site-specific projects will vary in purpose, location, and timing. Avoidance, compensation, or minimization strategies could include:

- Siting and aligning Program features to avoid or minimize impacts on agriculture.
- Examining structural and nonstructural alternatives to achieving project goals to avoid impacts on agricultural land.
- Implementing features that are consistent with local and regional land use plans.
- Involving all affected parties, especially landowners and local communities, in developing appropriate configurations to achieve the optimal balance between resource impacts and benefits.
- Retaining water allocations from retired drainage-impaired lands within the existing water districts.

- Supporting the testing and application of alternative crops to idled farmland (for example, agroforestry or energy crops).
- Providing water supply reliability benefits to agricultural water users on an equitable basis.
- Supporting the Agricultural Land Stewardship Program in acquiring easements on agricultural land in order to prevent its conversion to urbanized uses and increase farm viability.
- Restoring existing degraded habitat as a priority before converting agricultural land.
- Focusing habitat restoration efforts on developing new habitat on public lands before converting agricultural land.
- If public lands are not available for restoration efforts, focusing restoration efforts on acquiring lands that can meet ecosystem restoration goals from willing sellers where at least part of the reason to sell is an economic hardship (for example, lands that flood frequently or where levees are too expensive to maintain).
- Using farmer-initiated and developed restoration and conservation projects as a means of reaching Program goals.
- Where small parcels of land need to be acquired for waterside habitat, seeking out points of land on islands where the ratio of levee miles to acres farmed is high.
- Obtaining easements on existing agricultural land for minor changes in agricultural practices (such as flooding rice fields after harvest) which would increase the value of the agricultural crop(s) to wildlife.
- Including provisions in floodplain restoration efforts for compatible agricultural practices.
- Purchasing water for habitat purposes so that the same land or locality is not affected over the long term.
- Using a planned or phased habitat development approach in concert with adaptive management.
- Developing buffers and other tangible support for remaining agricultural lands. Vegetation planted on these buffers should be compatible with farming and habitat objectives.
- In implementing levee reconstruction measures, working with landowners to establish levee reconstruction methods that avoid or minimize the use of agricultural land.

- Working with landowners to establish levee subsidence BMPs that avoid impacts on land use practices. Through adaptive management, further modify BMPs to reduce impacts on agricultural land.

- Implementing erosion control measures to the extent possible during and after project construction activities. These erosion control measures can include grading the site to avoid acceleration and concentration of overland flows, using silt fences or hay bales to trap sediment, and revegetating areas with native riparian plants and wet meadow grasses.

- Protecting exposed soils with mulches, geotextiles, and vegetative ground covers to the extent possible during and after project construction activities in order to minimize soil loss.

- Using rotational fallowing to reduce selenium drainage.

7.1.12 POTENTIALLY SIGNIFICANT UNAVOIDABLE IMPACTS

Actions associated with the Ecosystem Restoration, Levee System Integrity, and Water Quality Programs, and the Storage and Conveyance elements could convert up to a maximum of 243,000 acres of existing prime, state-wide important, and unique farmland to Program uses. The loss of agricultural lands in these categories cannot be fully mitigated and is considered potentially significant. Because no other category of land in the Program area is available and usable for Program projects, the loss of these agricultural lands is considered unavoidable. Also, conflicts with local land use plans could constitute a potentially significant impact which is considered to be unavoidable.

The loss of important farmland cannot be fully mitigated and is considered a potentially significant and unavoidable impact.